103 ALONE   **MAX**   **Carry over**

103 with Rogin   103 with ~~103~~ Begin

1

2 BW   6   Allocate if cost below
              + enough residual   11 Take from portion or
~~3~~   Diff portion level
          3 cost to Pres. MAX cost   12 Prefer priority level is higher

4 # of Hops   14   18

5 Hops to ref Hops   15   19

7 if don't Allocate, 22   30
   report return
   subs   23   31

8 MPLS   25   37 See 18
   decide if to Allocate
   By compare   38 See 12
   Take into Acct
6 → Prefer Priority level 33   49 see 18
     when decide if to Allocate
              34   50 see 12
   32
              ~~32~~   51 Fig10 of HSD
   35
              ~~33~~   52 58
   36   59
13 5A   41
    BW 39
        40 42

16   43

17 compute 53
    rules
              56   44
~~20~~ 29 57   54

21
24 45   55

26 46
27 47
28 48

US-PAT-NO: 6034946

DOCUMENT-IDENTIFIER: US 6034946 A

TITLE: Selection of routing paths in data
communications
                         networks to satisfy multiple
requirements

---------- KWIC ---------

Detailed Description Text - DETX (16):
   The identification of routing paths which satisfy
Equations (2a) and (2b)
according to various embodiments of the present invention is
illustrated in
FIG. 3. As shown in FIG. 3, upon receipt of a data
transmission request (block
10) a network controller 95 determines if the signal to be
transmitted is a
constant bit rate signal or a variable bit rate signal (block
12). If the
signal is a variable bit rate signal, the network controller
identifies network
routing paths which have an associated "cost" (which serves
as a proxy for the
total delay and the queuing delay) that is less than or equal
to some maximum
specified value. This is accomplished by determining the
cost associated with
each link in a potential network routing path (block 20 and
block 22) and,
using these cost values, determining the total cost
associated with the routing
path (block 24). This total cost is then compared to the
maximum allowable
cost permitted for the signal which is to be transmitted
(block 26). This
process is repeated until the total cost has been computed
and compared to the
maximum allowable cost for some or all of the paths over
which the data could
be transmitted across the network (block 28) or until a path
satisfying the

criteria is located (block 26). In this first embodiment of the present
invention, the cost associated with each link (block 20) is determined a
$C_1 q_i + C_2 p_i$ where q_i and p_i are the queuing and
propagation delays of the ith link. These link values are summed (block
24) to determine the total cost for a path and that total cost is compared to
$C_1 C_2$.

Detailed Description Text - DETX (17):
    If the signal to be transmitted is a constant bit rate signal, then, the
network controller determines if propagation time data is available (block 14).
If propagation time data is not available, the cost associated with each link
in a potential network routing path (block 30 and block 32) is again determined
and, using these cost values, the total cost associated with the routing path
(block 34) is determined. This total cost is then compared to the maximum
allowable cost permitted for the signal which is to be transmitted (block 36).
This process is repeated until the total cost has been computed and compared to
the maximum allowable cost for some or all of the paths over which the data
could be transmitted across the network (block 38) or until a path satisfying
the criteria is located (block 36). In this second embodiment of the present
invention, the cost associated with each link (block 30) is determined by
$2C_1 q_i + (C_1 + C_2)p_i$ where q_i and p_i are the
queuing and propagation delays of the ith link. These link values are
summed (block 34) to determine the total cost for a path and that total cost is
compared to $C_1 (C_1 + C_2)$

Detailed Description Text - DETX (18):

If the signal to be transmitted is a constant bit rate signal and
propagation time data is available, the cost associated with each link in a
potential network routing path (block 40 and block 42) is again determined and,
using these cost values, the total cost associated with the routing path (block
44) is determined. This total cost is then compared to the maximum allowable
cost permitted for the signal which is to be transmitted (block 46). This
process is repeated until the total cost has been computed and compared to the
maximum allowable cost for some or all of the paths over which the data could
be transmitted across the network (block 48) or until a path satisfying the
criteria is located (block 46). In this third embodiment of the present
invention, the cost associated with each link (block 40) is determined by
$(c_1 - p_{min})q_i + x_0 p_i$ where q_i and p_i are the
queuing and propagation delays of the ith link, p_{min} is the minimum
propagation delay and $x_0 = (c_1 + c_2)(c_1 - p_{min})/2c_1$. These link values are summed (block 34) to determine the
total cost for a path and that total cost is compared to $C_1 x_0$.

Detailed Description Text - DETX (31):
   As will be understood by those of skill in the art, any conventional
"shortest path" routing technique may be modified to utilize the cost
evaluation and proxies of the present invention. As such, it should be
understood that the present invention is not limited to any particular path
selection technique, as any number of conventional techniques may be used to
carry out the present invention simply by modifying the "cost" value which is
attributed to each transmission link in the network and by calculating a

US-PAT-NO: 6259673

DOCUMENT-IDENTIFIER: US 6259673 B1

TITLE: Route selection method

---------- KWIC ---------

Detailed Description Text - DETX (28):
   At step S14, the sum of costs ranging from the maximum
cost to a [n (the
number of nodes)-1]th largest cost is set as the upper limit
value CUB.   In the
present embodiment, the number of nodes is 10 (A to J).   As
the sum of costs
ranging from the maximum cost of 26 (between A and E) to the
ninth cost,
therefore, 78 is set as the upper limit value CUB.   Because
26 (between A and
E)+20 (between C and D)+20 (between F and J)+2 (between A and
B)+2 (between A
and G)+2 (between B and C)+2 (between C and F)+2 (between E
and F)=78.

Current US Original Classification - CCOR (1):
   370/238